

# REPUBLIC OF THE PHILIPPINES

## EDICT OF GOVERNMENT

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PNS/PAES 236 (2008) (English): Agricultural Machinery - Crystallizer - Specifications



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# **PHILIPPINE NATIONAL STANDARD**

**PNS/PAES 236:2008  
(PAES published 2008)  
ICS 65.060.01**

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## **Agricultural Machinery – Crystallizer – Specifications**



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### **National Foreword**

This Philippine Agricultural Engineering Standards PAES 236:2008, Agricultural Machinery – Crystallizer – Specifications was approved for adoption as Philippine National Standard by the Bureau of Product Standards upon the recommendation of the Agricultural Machinery Testing and Evaluation Center.

## **Foreword**

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) through the project “Multicrop Processing Machines for ‘Commercialization’” funded by the Department of Science and Technology (DOST) through its Technology Innovation for Commercialization (TECHNICOM) Program and monitored by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD).

This standard has been technically prepared in accordance with BPS Directives Part 3:2003 – Rules for the Structure and Drafting of International Standards.

The word “shall” is used to indicate mandatory requirements to conform to the standard.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In the preparation of this standard, the following documents/publications were considered:

Bates, R.P., J. R. Morris and P. G. Gandall. Principles and practices of small-and medium scale fruit juice processing. [www.fao.org/docrep/005/Y2515E/y2515e00.htm](http://www.fao.org/docrep/005/Y2515E/y2515e00.htm)

Beet              Sugar              Green              Syrup              and              Molasses.  
[http://www.energymanagertraining.com/sugar/pdf/beet\\_roots5.pdf](http://www.energymanagertraining.com/sugar/pdf/beet_roots5.pdf)

Bautista, O. K. and H. B. Aycardo. Ginger: Its Production, Handling, Processing and Marketing with Emphasis on Export. Department of Horticulture, College of Agriculture, University of the Philippines Los Baños. 1979.

CIGR Handbook of Agricultural Engineering- Volume IV- Agro-Processing Engineering. Published by American Society of Agricultural Engineers. 1999.

Malinis, Arnulfo P., et al. Development of the Integrated Multicrop Processing System (Zero Waste Ginger Processing Technology). 2004.

Mechanical Pan Stirrers. <http://sugartech.co.az/vacuumpans/panstirrer.php>

Recommended Code of Practice for Processing and Handling of Muscovado Products

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**Agricultural Machinery –Crystallizer– Specifications**

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**1 Scope**

This standard specifies the fabrication and performance requirements for crystallizer used in the production of ginger tea (instant “salabat”). This standard is also applicable for crystallizer used for jam production however some parts such as performance requirements further needs studies and testing to be established.

**2 References**

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this National Standard:

AWS D1.1:2000 Structural Welding Code - Steel

PAES 102:2000 Agricultural Machinery – Operator’s Manual – Content and Presentation

PAES 103:2000 Agricultural Machinery – Method of Sampling

PAES 237:2008 Agricultural Machinery: Crystallizer – Methods of Test

**3 Definitions**

For the purpose of this standard the following definitions shall apply:

**3.1****burner**

main source of heat used in cooking ginger juice

**3.2****crystallizer (See Fig. 1)**

machine that cooks ginger juice to produce ginger tea (instant “salabat”)

**3.3****cooking basin**

part of the crystallizer where ginger juice are being loaded for cooking operation

**3.4****cooking recovery**

ratio between the total weight of recovered ginger tea (instant “salabat”) and the weight of sugar added to the input ginger juice

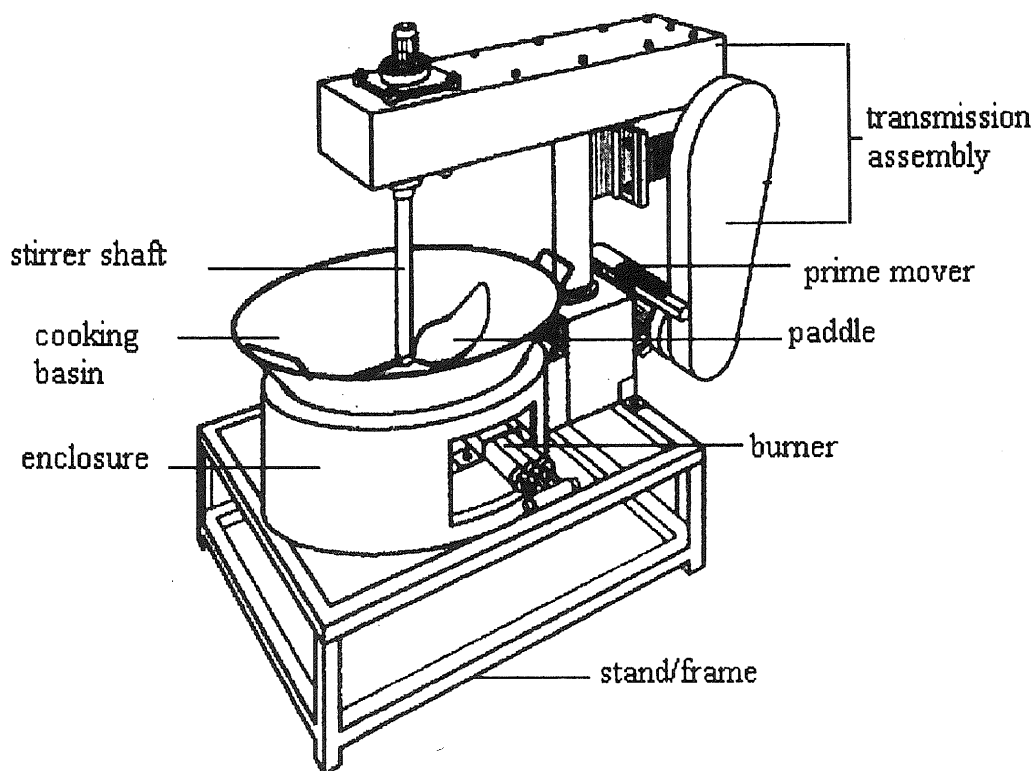


Figure 1. Typical design of a crystallizer

### 3.5

#### **ginger tea (instant "salabat")**

crystallized form of ginger from its juice

### 3.6

#### **holding capacity**

weight of input juice per batch, expressed in kilogram per batch

### 3.7

#### **liquefied petroleum gas (lpg)**

type of fuel used in cooking ginger juice

### 3.8

#### **paddle**

component of the crystallizer that is used in stirring to attain the desired consistency of the mixture to produce ginger tea (instant "salabat")

## **4 Fabrication Requirements**

Generally, the parts of the crystallizer shall be readily serviceable. Food grade materials shall be used for parts in direct contact of the material being processed.

**4.1** Crystallizer should consist of cooking basin, stirrer assembly, burner, transmission assembly, prime mover and frame.

**4.2** The cooking basin shall be made of non-corrosive, food grade and oxidation resistant materials, e.g. stainless steel (Grade 316 or higher).

4.3 The stirrer shaft and paddle shall be made of non-corrosive and food grade materials, e.g. stainless steel (Grade 316 or higher).

4.4 The burner shall provide the required heat for the operation of 80°C – 150 °C and shall be provided with an enclosure to minimize dissipation of heat.

4.5 Crystallizer shall be provided with a frame/stand that can withstand its load, e.g. angle bars or channel bars.

4.6 All welded parts shall conform to AWS D1.1:2000.

## **5 Performance Requirements**

The crystallizer when tested in accordance with PAES 237 shall conform to the following requirements:

5.1 The minimum cooking recovery shall be 90 %.

5.2 The final product, ginger tea (instant “salabat”) should have an average particle size diameter of 0.310 mm (pass thru sieve number 40).

5.3 Stirring speed shall be 40 to 50 rpm.

5.4 The power requirement shall be 0.37 kW (½ hp) for six (6) kilogram capacity.

5.5 The operation shall conform to Good Manufacturing Practice (GMP) requirements.

5.6 The noise emitted by the crystallizer measured 50 mm away from the operator’s ear level at actual working position shall not be more than 96 db (A).

NOTE: Allowable noise level for four (4) hours of continuous exposure based on Occupational Safety and Health Hazards, Ministry of Labor, Philippines. 1983

## **6 Safety, Workmanship and Finish**

6.1 The crystallizer shall be free from manufacturing defects that may significantly affect its design capacity and performance.

6.2 All machine surfaces not in contact with the material shall be coated with a suitable paint material.

6.3 The crystallizer shall be free from sharp edges and surfaces that may injure the operator.

6.4 Protective covers shall be provided for all rotating components and power transmission system.

6.5 Enclosure of the burner shall be provided with insulation.



## **7 Warranty for Fabrication and Durability**

**7.1** Warranty against defective materials and workmanship shall be provided for parts and services except for normal wear and tear of consumable maintenance parts such as belts within one year from the purchase of the crystallizer.

**7.2** The crystallizer shall be rigid and should endure normal use without breakdown of its major components (e.g. transmission assembly, etc.) for at least one (1) year from the date of original purchase. ts  
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## **8 Maintenance and Operation**

**8.1** Each crystallizer unit shall be provided with a set of manufacturer's standard tools required for maintenance. ls

**8.2** An operator's manual, which conforms to PAES 102, shall be provided by the manufacturer. ie

**9.3** The crystallizer shall be easy to clean and maintain.

## **9 Sampling**

The crystallizer shall be sampled for testing in accordance with PAES 103.

## **10 Testing**

Sampled crystallizer shall be tested in accordance with PAES 237.

## **11 Marking**

**11.1** Each crystallizer shall be marked in English with the following information using a stencil or by directly punching it on a plate and shall be positioned at a most conspicuous place: a  
is

**11.1.1** Registered trademark of the manufacturer

**11.1.2** Brand

**11.1.3** Model

**11.1.4** Serial number

**11.1.5** Output product, kg/batch

**11.1.6** Power requirement, kW

**11.1.8** Name and address of the importer, if imported

**11.1.9** Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)

**11.2** Safety/precautionary markings shall be provided when appropriate. Marking shall be stated in English and Filipino and shall be printed in red color with a white background.

**11.3** The markings shall have a durable bond with the base surface material.

**11.4** The markings shall be water resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.